

## Process for the production of polyunsaturated fatty acids in transgenic organisms

## Abstract

The present invention relates to a process for the production of polyunsaturated fatty acids in an organism by introducing, into the organism, nucleic acids which encode polypeptides with  $\Delta 5$ -elongase activity. Advantageously, these nucleic acid sequences can be expressed in the organism, if appropriate together with further nucleic acid sequences which encodes polypeptides of the biosynthesis of the fatty acid or lipid metabolism. Especially advantageous are nucleic acid sequences which encode a  $\Delta 6$ -desaturase, a  $\Delta 5$ -desaturase,  $\Delta 4$ -desaturase and/or  $\Delta 6$ -elongase activity. These desaturases and elongases are advantageously derived from *Thalassiosira*, *Euglena* or *Ostreococcus*. The invention furthermore relates to a process for the production of oils and/or triacylglycerides with an elevated content of long-chain polyunsaturated fatty acids.

In a preferred embodiment, the present invention furthermore relates to a method for the production of unsaturated  $\omega 3$ -fatty acids and to a method for the production of triglycerides with an elevated content of unsaturated fatty acids, especially  $\omega 3$ -fatty acids with more than three double bonds. The invention relates to the generation of a transgenic organism, preferably a transgenic plant or a transgenic microorganism, with an elevated content of unsaturated  $\omega 3$ -fatty acids, oils or lipids with  $\omega 3$ -double bonds as the result of the expression of the elongases and desaturases used in the process according to the invention, advantageously in conjunction with  $\omega 3$ -desaturases, for example an  $\omega 3$ -desaturase from fungi of the family Pythiaceae such as the genus *Phytophthora*, for example the genus and species *Phytophthora infestans*, or an  $\omega 3$ -desaturase from algae such as the family of the Prasinophyceae, for example the genus *Ostreococcus*, specifically the genus and species *Ostreococcus tauri*, or diatoms such as the genus *Thalassiosira*, specifically the genus and species *Thalassiosira pseudonana*.

The invention furthermore relates to the nucleic acid sequences, nucleic acid constructs, vectors and organisms comprising the nucleic acid sequences according to the invention, vectors comprising the nucleic acid sequences and/or the nucleic acid constructs and to transgenic organisms comprising the abovementioned nucleic acid sequences, nucleic acid constructs and/or vectors.

A further part of the invention relates to oils, lipids and/or fatty acids produced by the process according to the invention and to their use. Moreover, the invention relates to unsaturated fatty acids and to triglycerides with an elevated content of unsaturated fatty acids and to their use.